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MICHIGAN ACADEMY OF SCIENCE,
ARTS AND LETTERS

VOLUME IV

PART II

A KEY TO THE SNAKES OF THE UNITED STATES, CANADA
AND LOWER CALIFORNIA

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PAPERS
OF THE
MICHIGAN ACADEMY OF SCIENCE
ARTS AND LETTERS

EDITORS

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NOTE

The *Key to the Snakes of the United States, Canada and Lower California* was presented before the Section of Zoology of the Michigan Academy of Science, Arts and Letters at the annual meeting of 1924. That the paper might be in convenient form for quick reference by herpetologists and by others of more general interests, it was deemed advisable to print and bind it separately.

THE EDITORS

PREFACE

THE absence of any general reference work for the accurate determination of the species of North American snakes induced the writer to undertake the preparation of a key to all the species and subspecies of snakes in North America, north of the Rio Grande. Lower California was included in order to make the area covered coincident with that selected by Stejneger and Barbour for their recent *Check List of North American Amphibians and Reptiles*.

The purpose behind the work has been to provide (1) a simple means for the prompt and accurate identification of any snake in this region, without the necessity for dissection, or for examination of teeth, (2) a synopsis of the genera and species inhabiting the area, and (3) as accurate a determination as possible of the distribution of each species and subspecies. Certainty of identification has not been sacrificed to brevity, but that the key will fail in some instances is to be expected from the great individual variation in the scale characters of snakes.

The greater portion of the key is based almost exclusively upon the writer's personal examination of specimens in various museums, chiefly those in the United States National Museum, but of the genera *Coluber*, *Crotalus*, *Pituophis* and *Thamnophis* he has, for various reasons, made no critical study. A preliminary synopsis of the genus *Coluber*¹ has been kindly furnished by Mr. A. I. Ortenburger, who has now nearly completed a detailed study of these snakes. The key to the genus *Thamnophis* has been adapted, with slight alteration, from the studies of Ruth-

¹ The genus *Coluber* as currently understood has been divided by Ortenburger (Occ. Pap. Mus. Zool., Univ. Michigan, No. 139) into a restricted genus *Coluber* to include the "constrictor" group, and *Masticophis* to include the other "racers" and the "whip-snakes." Pending publication of the detailed evidence on which this separation is based, the author has adopted Ortenburger's classification.

ven and of Van Denburgh. The arrangement of the gopher snakes, *Pituophis*, has been taken from Van Denburgh and various eastern authors, that of the rattlesnakes, *Crotalus*, has been adapted from Stejneger and later writers.

The ranges have been determined largely on the basis of the specimens in various museums, and of published records. This work has brought out the value of local lists when compiled by trustworthy authors, and particularly when accompanied by detailed descriptions of the specimens upon which the lists are based.

The arrangement of genera is according to systematic standards in the main, but this order has been sacrificed in many cases to the convenience of the user of the key.

Further information on the snakes may be obtained from the selected list of references at the end. Here are included recent general works and such of the latest local lists as are more or less complete.

The basis of the nomenclature used is the Stejneger and Barbour *Check List*. No attempt has been made to verify the validity of scientific names except in genera of which the writer has made a special study, i. e., *Natrix*, *Diadophis*, *Virginia*, *Carphophis* and *Lampropeltis*. Occasional names, however, have been revived or omitted as has seemed necessary. For example, the writer cannot find a valid basis for the recognition of two species or subspecies of *Hypsiglena*, nor can he distinguish a Texas form of *Elaphe* of the *obsoleta* group, generally called *E. obsoleta lindheimeri*, nor does *Thamnophis ordinoides biscutatus* seem to him to be more than a local emphasis upon a variation wide-spread in *T. ordinoides vagrans* and *T. ordinoides ordinoides*, nor does he see anything in *Crotalus goldmani* but a synonym of *C. mitchelli*. To the writer, a species is a population of similar individuals of similar habits, freely interbreeding and maintaining a high degree of constancy in most superficial as well as in all fundamental details throughout a generally considerable area. An unusual local emphasis on minor features is not regarded as of taxonomic significance. A subspecies is of the same nature as a species except that it intergrades with a closely allied race in a relatively narrow area where the two ranges adjoin.

There are recognized in this key one hundred and ninety-one species and subspecies of North American snakes, exclusive of continental Mexico and Central America, but many changes in our understanding of these genera and species are inevitable. In many cases further knowledge of variation, distribution, habits and relationships awaits the slow discovery of more specimens. Such instances are the genera *Phyllorhynchus*, *Sonora*, *Chilomeniscus*, *Stylophis*, *Liodytes* and *Seminatrix*, and the species *Elaphe bairdi*, *E. subocularis*, *Lampropeltis alterna* and *Ficinia cana*. Many genera which are common are, however, still little understood. Of these, museums already have on hand fairly extensive collections ready to serve as a basis for systematic and distributional studies, and an understanding of their natural history awaits only the necessary field observations. Particularly in need of study are the snakes of such common genera as *Elaphe*, *Natrix*, *Pituophis*, *Crotalus* and *Micrurus*. These will all repay well in interesting results whoever will take up their investigation. Revisional studies, to attain their highest aim, will not be limited by a region, but by a natural biological unit, such as the genus, and they will not be confined to analytical and descriptive work alone, but will attempt to explain distribution and will use every means to arrive at an understanding of relationships.

In its present form this key would have been quite impossible without kindly advice on many details and a generous provision of material for study. For these courtesies the writer wishes to mention in particular Dr. Leonhard Stejneger and Miss Doris M. Cochran of the United States National Museum, Professor Alexander G. Ruthven and Mrs. Helen Thompson Gaige of the Museum of Zoology of the University of Michigan, Dr. Thomas Barbour of the Museum of Comparative Zoology, and Dr. G. Kingsley Noble of the American Museum of Natural History. To Dr. Frieda Cobb Blanchard the writer is indebted for the preparation of nearly all of the drawings and for advice and criticism throughout the development of the work.

FRANK N. BLANCHARD

UNIVERSITY OF MICHIGAN

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A KEY TO THE SNAKES OF THE
UNITED STATES, CANADA AND
LOWER CALIFORNIA *

This Key is arranged in the conventional dichotomous form. The specific name, therefore, of any snake occurring within the geographical limits given above may be found by selecting the correct one of the two alternatives offered, proceeding to the choice indicated by the number at the right hand margin, and repeating this procedure until the name is reached. Family names are included incidentally at the appropriate places. The range or distribution of the species will be found in parentheses directly below the specific name. Since the figures are intended primarily to illustrate technical terms and special details of scalation, the legends under them give merely the specific names. For the description of a figure, including the place where the specimen was collected, the museum where it is deposited, its museum number, and its magnification, reference should be made to the List of Illustrations, pages 59-62. Full explanation of the meanings of technical terms will be found in the Glossary on pages 55-56.

- | | | |
|---|---|---|
| 1 | Ventral scales larger than dorsal scales and elongated transversely | 4 |
| | Ventral scales like dorsal, not transversely elongated | 2 |
| 2 | Tail conspicuously flattened laterally for swimming | |
| | Sea snakes Distepiridae <i>Pelamys platurus</i> (Linné) | |
| | (Tropical Pacific and Indian oceans, Gulf of California near Espiritu Santo Island) | |
| | Tail rounded -- not flattened for swimming | |
| | Leptotyphlopidae | 3 |

* Contribution from the Zoological Laboratory of the University of Michigan

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- 3 Supraoculars present (Fig 1)

Leptotyphlops dulcis (Baird & Girard)
(Northern Mexico, Texas, Oklahoma and New Mexico)

- Supraoculars absent (Fig 2)

Siagonodon humilis (Baird & Girard)
(Deserts of Arizona, southern California, Lower California and northwestern Mexico)

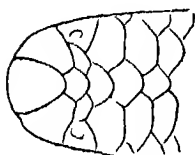


FIG 1 *Leptotyphlops dulcis*

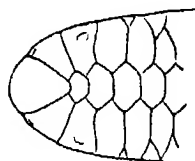


FIG 2 *Siagonodon humilis*

- 4 No pit between eye and nostril (Fig 3)

5

Deep pit between eye and nostril (Fig 4) Crotalidae 186

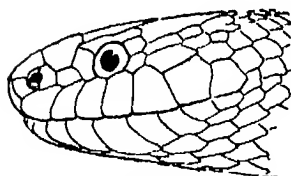


FIG 3
Triangulum triangulum

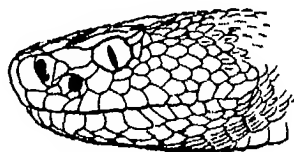


FIG 4
Sistrurus catenatus catenatus

- 5 One or two pairs of enlarged, elongated shields on chin between lower labials, tail never decidedly blunt, pupil usually round (Fig 5)

Colubridae and Elapidae
Scales on chin between lower labials all small, tail short, blunt, with undivided caudals, pupil vertical (Fig 6) Boidae

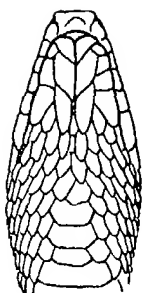


FIG 5

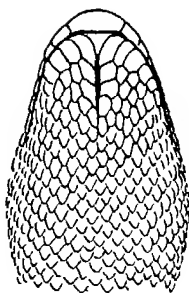
Salpadora grahamiae grahamiae

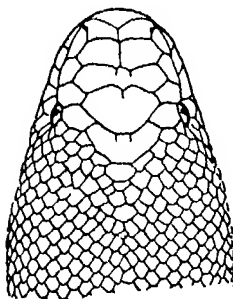
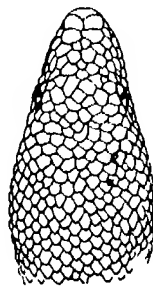
FIG 6

Charina bottae

- 6 A large median shield on top of head between eyes (Fig 7). Rubber snake (*Charina bottae* (Blainville)) (Humid districts of California, Nevada, Idaho, Montana, Utah, Oregon and Washington)

Numerous small scales on top of head between eyes (Fig 8)

Lachanura 7

FIG 7 *Charina bottae*FIG 8 *Lachanura roseofusca*

- 7 Ventrals more numerous, about 220-243, longitudinal bands, when present, not dark chocolate or blackish brown, and not in strong contrast with the ground color (*L. roseofusca* Cope (Southern California, northern Lower California and Arizona)

Frank N Blanchard

Ventrals fewer than 220, light with dark brown longitudinal bands in strong contrast *L. trivirgata* Cope
(Southern Lower California)

- | | |
|---|----|
| 8 Keels present on some or all of dorsal scales of body or tail (Fig 9) | 9 |
| Dorsal scales smooth on body and tail (Fig 10) | 87 |

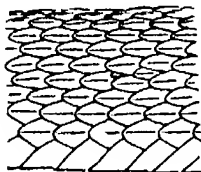


FIG 9
Dorsal scales with keels

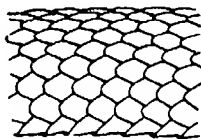


FIG 10
Dorsal scales without keels

- | | |
|---------------------------------|----|
| 9 Anal plate divided (Fig 11) | 10 |
| Anal plate not divided (Fig 12) | 54 |

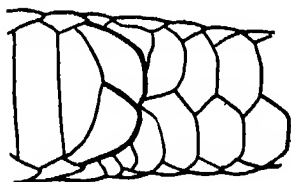


FIG 11 Divided anal plate

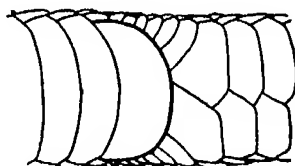


FIG 12 Undivided anal plate

- | | |
|---|-----------|
| 10 Rostral normal, not turned up in front and not keeled above (Fig 13) | 14 |
| Rostral turned up in front and keeled above (Fig 14) | 11 |
| Spreading adder | Heterodon |

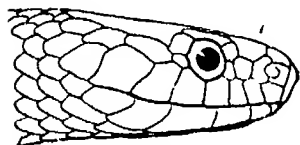


FIG 13
Diadophis punctatus edwardsi

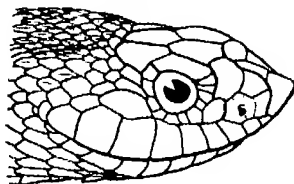
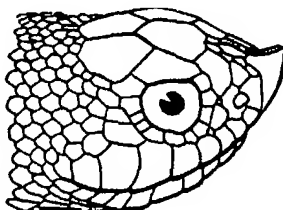


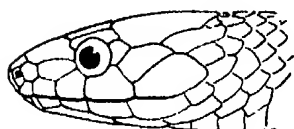
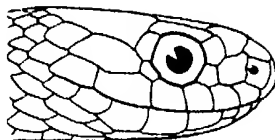
FIG 14 *Heterodon contortrix*

- 11 Prefrontals in contact, under side of tail generally
conspicuously lighter than abdomen (Fig 14) 12
- Prefrontals separated by small scales and often much
reduced, under side of tail not conspicuously
lighter than abdomen (Fig 15) 13

FIG 15 *Heterodon simus*

- 12 Internasals separated by a small scale, the azygous,
about 20-31 light cross-bars on body, or nearly
black above (Fig 14) *H. contortrix* (Linné)
(Eastern Montana to Massachusetts, south into
central Florida and west to central Texas and west-
ern Kansas)
- Internasals in contact, no azygous scale, about 16-19
light cross-bars on body *H. browni* Stejneger
(Southern Florida)
- 13 Scale rows, 23, dorsal spots on body about 24-45, un-
der side with much black *H. nasicus* Baird & Girard
(Arizona to Montana, east to western Iowa, and
south through Texas into northern Mexico)
- Scale rows, 25, rarely 27, dorsal spots on body about
22-26, under side more or less obscurely checked
but generally not largely black (Fig 15)
- H. simus* (Linné)
(Indiana and northern North Carolina to northern
Florida)

- | | | |
|----|---------------------------------|-------------|
| 14 | Loreal present (Figs 13 and 16) | 17 |
| | Loreal absent (Fig 17) | Storeria 15 |

FIG 16 *Potamophis striatulus*FIG 17 *Storeria occipito-maculata*

- 15 Scale rows, 17 *S. delayi* (Holbrook)
 (Southern Maine west through the Lower Peninsula of Michigan to central Minnesota and central Kansas and south, except peninsular Florida, to the Gulf of Mexico, and along the Mexican coast as far as Vera Cruz)
 Scale rows, 15 16
- 16 Belly reddish without spots, dorsal color generally extending well onto ends of ventrals, upper labials, 6 (rarely 7), ventrals, 116-133 (Fig 17) Red-bellied snake *S. occipito-maculata* (Storer)
 (From central Maine west through Wisconsin, Iowa, and eastern Kansas, and south through Alabama and Georgia to north central Florida, avoiding the lowlands of the coasts of the Carolinas and of the Mississippi Valley as far north as southern Illinois)
 Belly pale with a row of small black spots along each side, dorsal color extending only slightly onto ends of ventrals, upper labials, 7, ventrals, 138-150
S. victa Hay
 (Florida and southeastern Georgia)
- 17 Two internasals (Fig 18) 20
 One internasal (Fig 19) 18

Key to Snakes

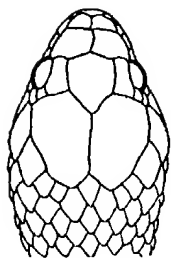


FIG 18 *Virginia valeriae elegans*

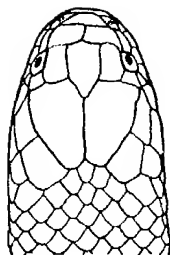


FIG 19 *Farancia abacura*

- 18 Upper labials, 5, lower labials, 6, body scales keeled, scale rows, 17 (Fig 16) *Potamophis striatulus* (Linné)
(Virginia to northern Florida, west in Texas and Oklahoma to the 98th meridian, and north in the Mississippi Valley to central Missouri)
Upper labials, 7 or 8, lower labials, 8-10, body scales nearly or quite smooth, scale rows, 19 or 21 19

- 19 No preocular, loreal meeting eye, nasals separated by rostral and internasal, ventrals about 172-196 (Fig 19) Horn snake *Farancia abacura* (Holbrook)
(Virginia to Florida and Texas, in the Mississippi Valley northward to southern Indiana)

One preocular, loreal not reaching eye, nasals meeting in midline, separating rostral and internasal ventrals about 118-124 (Fig 20)

Liodytes alleni (Garman)
(Southern Georgia and Florida)

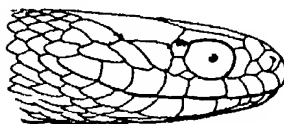
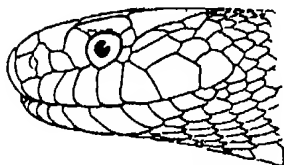
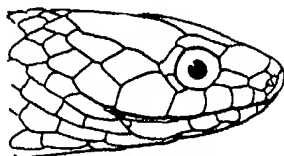


FIG 20 *Liodytes alleni*

- 20 One or two preoculars present (Fig 21) 24
 No preocular, loreal in contact with eye (Fig 22) 21

FIG 21 *Elaphe vulpina*FIG 22 *Virginia valeriae valeriae*

- 21 Upper labials, 5 or 6 22
 Upper labials 7 Rainbow snake
Abastor erythrogrammus (Daudin)
 (Coastal regions from southeastern Virginia to north-
 ern Florida and Alabama)
- 22 Upper labials, 6, 2 postoculars, occasionally 1 or 3
 (Fig 22) Virginia 23
 Upper labials, 5, a single postocular (Fig 16)
Potamophis striatulus (Linné) 18
- 23 Scales in 15 rows, few or none keeled
Virginia valeriae valeriae (Baird & Girard)
 (New Jersey to South Carolina, west to the Ten-
 nessee River and north to southern Ohio)
 Scales in 17 rows, usually keeled, at least posteriorly
V. valeriae elegans (Kennicott)
 (Southern Indiana, and eastern Illinois, south to the
 Gulf, and west to central Texas)
- 24 Scale rows more than 17 27
 Scale rows, 17 25
- 25 Tail long, caudals more than 100, ventrals about
 150-170 26
 Tail moderate, caudals less than 50, ventrals about
 110-135 *Seminatrix pygaea* (Cope)
 (Beaufort, North Carolina, south throughout Florida)

- 26 Color above, grass-green, upper labials, 7, lower labials, 8 or 7 Rough green snake
Opheodrys aestivus (Linné)
 (New Jersey, south on the Atlantic coastal plain throughout Florida, in the Mississippi Valley, north to southern Ohio, central Indiana, central Missouri, and southeastern Kansas, west to north-eastern New Mexico, and south throughout Texas)
 Color above dark with a light spot on each scale, upper labials, 9, lower labials, 10 or 11
Drymobius margaritiferus (Schlegel)
 (Southern Texas to Venezuela and Colombia)
- 27 Dorsal scales strongly keeled, 3 postoculars, or, if only 2, then the scale rows are only 19 (occasionally 23) Water snakes NATIX 28
 Dorsal scales weakly keeled, 2 postoculars, scale rows 25-33 Elaphe 44
- 28 Scale rows more than 19 29
 Scale rows, 19 40
- 29 Scale rows, 21-25, lower labials usually 10 30
 Scale rows usually 27-33 (rarely 25), lower labials usually 11-13 36
- 30 Scale rows, 23-25, no median row of light spots on belly 31
 Scale rows, 21, if 23 rows of scales, then a median row of light spots on belly, at least anteriorly 38
- 31 No light line obliquely backwards from eye, ventrals, 135-155 32
 A light line from eye obliquely to angle of mouth, ventrals, 123-135 34
- 32 A pattern of dorsal and lateral blotches more or less evident 33
 Uniform dark above, and uniform light or reddish below, with dusky mottlings on posterior ventrals in

old individuals and dark bases to ventrals in young specimens, ventrals, 145-155 Copperbelly

Natrix sipedon erythrogaster (Forster)¹

(Lowlands of Virginia and the Carolinas, west to Louisiana and north in the Mississippi Valley into southern Illinois)

- 33 Belly usually with numerous black-edged half circles, lateral spots not alternating with dorsal spots as far forward as the head, scales usually in 23 rows Water Snake *N. sipedon sipedon* (Linné)²

(Northern Alabama to southern Maine, west to Minnesota and Colorado, south to Oklahoma and Arkansas)

Belly immaculate or with dusky mottling chiefly on antero-lateral ends of ventrals, lateral spots alternating with dorsal spots as far forward as the head, scales usually in 25 rows

N. sipedon transversa (Hallowell)³

(Oklahoma and Arkansas, south into Mexico, and west into New Mexico)

- 34 Dorsal saddles on body about 20 to 33 35
Dorsal saddles on body about 11 to 17

N. fasciata confluens Blanchard

(Eastern Louisiana north to southeastern Missouri, eastern and southern Arkansas, and west in Texas to about the 98th meridian)

- 35 Dorsal saddles on body commonly about 24, ventral plates usually more than 128, belly often with dark quadrate spots, often small lateral spots alternating with the dorsal saddles *N. fasciata fasciata* (Linné)

¹ The variations, distribution and systematic relations of this and the next two forms are much in need of study. The young of *N. sipedon erythrogaster* have about the same pattern as *N. sipedon transversa*

² See note 1

³ See note 1

(Northern Florida and coastal regions from North Carolina to southeastern Louisiana)

- Dorsal saddles on body commonly about 29, ventrals usually less than 128, belly with dark, sometimes reddish, anterior borders on the ventral scales, often reddish markings with black edges particularly on ends of ventrals, no small lateral alternating spots *N fasciata pictiventris* Cope
(Peninsular Florida)

- 36 A single anterior temporal, dorsal spots, if visible, more than 26, connected with lateral spots 37
Two anterior temporals, 21 to 26 isolated quadrate spots on back to vent Water pilot
N taxispilota (Holbrook)
(North Carolina to central Florida and possibly west to Louisiana)

- 37 Eye in contact with upper labials, dorsal spots, 26-33, a single series of conspicuous lateral spots extending from ventrals to eighth or ninth row of scales, alternating and connected with dorsal spots, scale rows usually 27, less often 25, 29, or 31
N rhombifera (Hallowell)
(Illinois and Indiana to Alabama and through Texas to Vera Cruz, Mexico)

- Eye separated from upper labials by one or more subocular plates, dorsal spots about 50, two series of small, often ill-defined, lateral spots in alternation, the lower series extending from the ventrals to about the fifth to seventh row of scales, dorsal spots small and indistinct, scale rows usually 29-31, less often 27 *N cyclopion* (Dumeril & Bibron)
(Extreme southern Illinois south through Louisiana and southeast throughout Florida)

- 38 A median row of light spots on belly, at least anteriorly 39

No median row of light spots on belly

N. valida (Kennicott)

(Southern Lower California and western Mexico)

39 Dorsal surface spotted or unicolor

N. compressicauda (Kennicott)

(Coastal regions of peninsular Florida [particularly west side] and adjacent coast of Cuba)

A median dorsal and two lateral light stripes

N. clarkii (Baird & Girard)

(Coastal regions of Texas, Louisiana and Alabama)

40 Upper labials, 5-7

41

Upper labials, 8

N. valida (Kennicott)

(Southern Lower California and western Mexico)

41 Lower labials, 9-11, preoculars usually 2

42

Lower labials, 7, preoculars, 1 Kirtland's water snake

N. kirtlandii (Kennicott)

(Central and northeastern Illinois and southern Michigan to western Pennsylvania, and south throughout Ohio and Indiana)

42 Two long dark stripes on middle of belly, at least anteriorly

43

One long median dark stripe on belly, or no markings (except on lateral ends of ventrals)

N. grahami (Baird & Girard)

(Illinois and eastern Kansas to Louisiana and Texas)

43 Ventro-lateral light stripes present Striped water snake

N. septemvittata (Say)

(Pennsylvania to Wisconsin, south to central Alabama)

No ventro-lateral light stripes

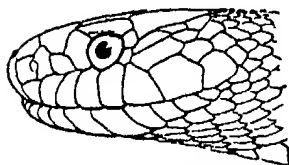
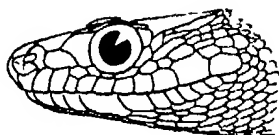
N. rigida (Say)

(South Carolina to western Louisiana and south into northern Florida)

44 No small scales (suboculars) between eye and upper labials (Fig 23)

A row of small scales (suboculars) between eye and upper labials (Fig 24)

45

FIG 23 *Elaphe vulpina*FIG 24 *Elaphe subocularis*

45 Dorsal pattern of H-shaped blotches (Fig 24)

Elaphe subocularis (Brown)

(Davis Mountains, Texas)

Uniform olive-brown above, no blotches

E. rosaliae (Mocquard)

(Central to southern Lower California)

46 Dark brown or black or with blotches or stripes above,
usually with dark markings below

47

Uniform grayish or greenish above, uniform whitish
below

E. chlorosoma (Günther)

(Guerrero and Jalisco, Mexico, northward to the
Santa Rita Mountains in Arizona)

47 Pattern not of 50 or more narrow dark cross-bands
separated by wide interspaces

48

Pattern of about 50 or more narrow dark cross-bands
separated by wide interspaces

E. bairdi (Yarrow)

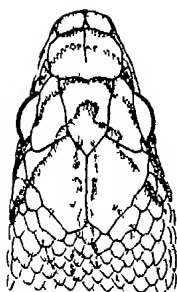
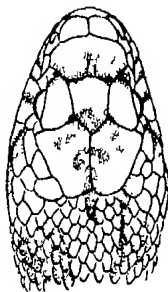
(Fort Davis, Texas)

48 Neck bands of same color as dorsal blotches, travers-
ing parietals and uniting on frontal plate, only the
median dorsal scales, if any, keeled (Fig 25)

49

No neck bands traversing parietals and uniting on
frontal, 3-11 rows of smooth scales on each side
(Fig 26)

51

FIG 25 *Elaphe laeta*FIG 26 *Elaphe vulpina*

- 49 Ventrals, 222-241, dorsal blotches, 27-40, reddish 50
 Ventrals, 211-222, dorsal blotches, 39-48, grayish or
 light brown (Fig 25) *E laeta* (Baird & Girard)
 (Kansas south to Central Mexico)
- 50 Belly yellowish, checked prominently with black
E guttata (Linné)
 (Virginia through Florida, west to the Mississippi
 and Louisiana)
- Belly pinkish, with little or no black *E rosacea* (Cope)
 (Florida Keys)
- 51 Ventrals, 226-244, dorsal blotches if present generally
 concave at anterior and posterior ends 52
 Ventrals, 194-211, 31-38 dorsal blotches with an-
 terior and posterior margins generally straight or
 slightly convex Fox snake (Figs 21, 26)
E vulpina (Baird & Girard)
 (Indiana, Illinois, Iowa and Minnesota to Michigan
 and Ontario)
- 52 Caudals, male, 73-87, female, 63-77, pattern not of
 longitudinal stripes, postocular dark line, when
 present, thick and not interrupted 53
 Caudals, male, 89-97, female, 69-95, pattern of 4
 longitudinal stripes in adult, young with blotches,
 postocular dark line, when present, narrow and

interrupted *E. quadrivittata* (Holbrook)
(Southeastern North Carolina, south throughout Florida)

- 53 Nearly or quite uniform black above, scale rows 25
or 27 (Young specimens like *E. obsoleta confinis*)
Pilot black snake *E. obsoleta obsoleta* (Say)
(Wisconsin to Massachusetts and south through
the Alleghenies)

A pattern of about 30-35 dark quadrate blotches
readily distinguishable, scale rows 27 or 29
E. obsoleta confinis (Baird & Girard)
(North Carolina through the Gulf states into Texas,
and north into Indiana)

- 54 Scale rows fewer than 29 65
Scale rows, 29-35 Pituophis 55

- 55 Rostral penetrating between internasals, conspicuously
higher than wide (Fig. 27) 56
Rostral not or but slightly penetrating between inter-
nasals, about as high as wide (Fig. 28) 59

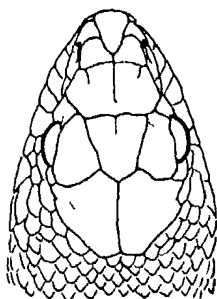


FIG 27
Pituophis sayi

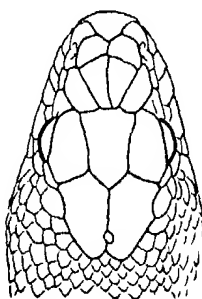


FIG 28
Pituophis catenifer deserticola

- 56 A pattern of dorsal spots 57
No dorsal spots evident 58
57 Dorsal spots on body 25-35 Pine Snake
P. melanoleucus (Daudin)

(New Jersey to eastern Tennessee and South Carolina)

Dorsal spots on body 40-60 Bull snake

P. sayi (Schlegel)

(Minnesota to Texas)

58 A pied pattern of rusty brown *P. mugitus* Barbour
(Florida)

Uniform black above and below *P. lodingsi* Blanchard
(Mobile County, Alabama)

59 Coloration on anterior half of body not largely red 60
Coloration on anterior half of body largely red, ventrals, 233 to 257, scales usually in 35 or 33 rows, dorsal blotches, 38-48, upper labials usually 9 or more *P. vertebralis* (Blainville)
(Southern Lower California)

60 Number of ventrals less number of dorsal blotches on body and tail rarely exceeds 151 61
Number of ventrals less number of dorsal blotches on body and tail usually more than 151, ventrals more than 220 63

61 Ventrals usually fewer than 225 (200-230), caudals, 51-80, average in males, 70, in females, 63, scale rows usually not more than 31 62
Ventrals usually more than 225 (217-243), caudals, 62-85, average in males, 76, in females, 70, scale rows usually more than 31

P. catenifer annectens (Baird & Girard)

(Coastal region of southern California and northern Lower California)

62 Dorsal blotches on body 50-93, average, 70, on tail 14-30, average, 21 *P. catenifer catenifer* (Blainville)
(Coast strip from Puget Sound to Santa Barbara County, California)

Dorsal blotches on body, 48-70, average, 58, on tail

13-19, average, 15 *P. catenifer heermanni* (Hallowell)
(Klamath region, Oregon, through the Great Valley
of California)

- 63 Sum of numbers of scale rows and of preoculars on
both sides of head rarely more than 33, usually one
preocular *P. catenifer stejnegeri* Van Denburgh
(Utah)

Sum of number of scale rows and of preoculars on
both sides of head usually more than 33 64

- 64 Sum of caudal blotches and preoculars on both sides
of head usually more than 16, usually 2 preoculars,
posterior dorsal blotches not distinctly reddish
 P. catenifer deserticola Stejneger
(Deserts of southern California, Nevada, Idaho and
eastern Washington)

Sum of caudal blotches and preoculars on both sides of
head rarely more than 16, usually one preocular,
posterior dorsal blotches often distinctly reddish or
red-brown *P. catenifer rutilus* Van Denburgh
(Southern Arizona)

- 65 Eye in contact with upper labials, rostral normal 66
Eye separated from upper labials by small scales,
rostral much enlarged, separating internasals and in
contact with prefrontals *Phyllorhynchus* 122

- 66 Lower labials, 8 or more Garter snakes *Thamnophis* 68
Lower labials, 5-7 67

- 67 A double row of black spots along middle of belly,
preocular distinct from loreal, scale rows, 17-19-17
 Tropidoclonion lineatum (Hallowell)
(Southern Ohio to Iowa and western Kansas and
south to the Gulf of Mexico)

Belly light, unspotted, no preocular, loreal in contact
with eye, scale rows, 17-17 or 17-15 (Fig 16)
 Potamophis striatulus (Baird & Girard)

(Virginia to Missouri, south to Mobile and eastern Texas)

- 68 Lateral stripe anteriorly upon third and fourth rows 69
Lateral stripe anteriorly not involving fourth row of
scales, or absent 74

- 69 Tail generally more than 0.27 of total length Ribbon
snakes 70
Tail generally less than 0.27 of total length 72

- 70 Upper labials usually 7

Thamnophis sauritus sauritus (Linné)

(United States east of the 87th parallel, and north
of Florida)

- Upper labials usually 8 71

- 71 Tail between 0.25 and 0.35 of total length, dorsal
stripe present throughout *T. sauritus proximus* (Say)
(Wisconsin to western Nebraska, south through
Texas and Louisiana, and along the coastal regions
to Nicaragua)

Tail between 0.32 and 0.38 of total length, dorsal
stripe usually absent, or present only directly be-
hind the head *T. sauritus sackeni* (Kennicott)
(Florida and coastal regions of adjacent states)

- 72 Dorsal scale rows usually a lower formula than 21-
19-17, upper labials usually less than 8 73

Dorsal scale rows usually 21-19-17, upper labials, 8,
occasionally 9 *T. megalops* (Kennicott)
(Plateau of Mexico north to southwestern New
Mexico, southern Arizona, and the Cocopah Moun-
tains in Lower California)

- 73 Dorsal scale rows usually 19-21-19-17, upper labials,
7 or 8 *T. radix radix* (Baird & Girard)
(Great Plains and prairie regions of central North
America)

Dorsal scale rows usually 19-17, upper labials, 6 or 7
T. radix bulleri (Cope)

(Indiana, Ohio, southern Michigan, western Pennsylvania)

- 74 Lateral stripe anteriorly upon scales of second and third rows, or absent 75
 Lateral stripe on the third row only
T. marcianus (Baird & Girard)
 (Oklahoma and Texas to southeastern California and northern Mexico)
- 75 Upper labials normally 7 76
 Upper labials normally 8 80
- 76 Eye large, posterior chin-shields much longer than anterior, lower labials usually 10, scale rows, 19-17 77
 Eye much smaller, posterior chin-shields about equal to anterior, lower labials usually fewer than 10, scale rows usually 17-15
T. ordinoides ordinoides (Baird & Girard)
 (Coastal regions from British Columbia to northern California)
- 77 Both rows of lateral spots distinct on the skin, interspaces not generally red *T. sirtalis sirtalis* (Linné)
 (North America east of the 91st meridian and south of the 52d parallel)
 Upper row of lateral spots usually fused on the skin, interspaces generally red 78
- 78 Ventrals (146-170) and caudals (66-95) average respectively 156-166 and 76-85 79
 Ventrals (156-177) and caudals (74-97) average respectively 163-169 and 83-90, coloration lighter than in *T. sirtalis concinnus*
T. sirtalis infernalis (Blainville)
 (Southern Oregon, western Nevada and California except the northwestern part)
- 79 Coloration lighter, with broader light lines Red-sided garter snake *T. sirtalis parietalis* (Say)

- (Central Alberta and Minnesota, south through northern Missouri, and west through Nevada and eastern Washington)
- Coloration usually darker both above and below, lines often narrower *T sirtalis concinnus* (Hallowell)
 (Coast region from British Columbia to San Francisco Bay)
- 80 Scales usually in more than 19 rows 82
 Scales usually in not more than 19 rows 81
- 81 Ventrals average more than 160, eye large, posterior chin-shields longer than anterior *T eques* (Reuss)
 (Arizona to western Texas and south to Guatemala)
 Ventrals average fewer than 160, eye small, posterior chin-shields about equal to anterior
T ordinoides atratus (Kennicott)
 (Coastal region of California south to Santa Barbara County)
- 82 Dorsal stripe present over most of body 83
 Dorsal stripe usually absent, or short, or indistinct 85
- 83 Dorsal stripe with borders invaded by dorsal spots, dark pigmentation of ventrals often present 84
 Dorsal stripe very distinct with sharply defined borders not invaded by dorsal spots, little dark pigmentation on ventrals *T ordinoides elegans* (Baird & Girard)
 (Sierra Nevada and San Bernardino Mountains)
- 84 Ventrals usually 160-180
T ordinoides vagrans (Baird & Girard)
 (Idaho and eastern Washington south to eastern California and northern Arizona)
 Ventrals, 151-161 *T hueyi* Van Denburgh & Slevin
 (San Pedro Martir Mountains, Lower California)
- 85 No dorsal stripe, often more than one preocular, lower labials rarely more than 10 86

Remnant of dorsal stripe usually present, preocular single, lower labials more than 10

T ordinoides couchii (Kennicott)

(Sacramento and San Joaquin valleys of California from Shasta to Kern counties and on the eastern side of the Sierra Nevada into western Nevada)

- 86 Lateral stripes usually present, dorsal spots fewer, or absent *T ordinoides hammondi* (Kennicott)
(Southern California west of the deserts, and south to central Lower California)

Lateral stripes usually absent, dorsal spots very numerous and prominent *T angustirostris* (Kennicott)
(Southern Arizona and southwestern New Mexico south to Coahuila and Durango)

- 87 Anal plate divided (Fig 29) 123
Anal plate not divided (Fig 30) 88

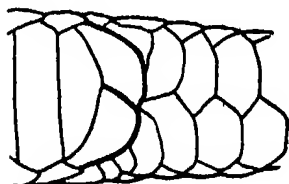


FIG 29 Divided anal plate

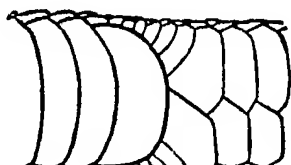


FIG 30 Undivided anal plate

- 88 Scale rows not the same in number at the posterior end of the body as at the middle 89
Scale rows the same in number at the posterior end of the body as at the middle 118
89 None (or rarely a very few) of the caudals entire 90
Many (20-40) of the caudals entire

Rhinocheilus lecontei (Baird & Girard)

(From western Kansas and the 97th meridian in Texas, northwest to southern Idaho and northern California, and south through Lower California)

- 90 Belly never entirely without dark markings; rostral normal, lower labials, 7 to 10, only rarely 11 or 12.
King snakes *Lampropeltis*. 92

Belly light and immaculate; rostral penetrating prominently between internasals, lower labials, 12-15, commonly 13 or 14 Arizona 91

- 91 Scale rows usually 29 or 31, dorsal blotches on body about 55 (40 to 57), large and squarish, covering about 12 or 13 lateral rows of scales and 2 to 3 longitudinal rows, and separated by 1 to $1\frac{1}{2}$ scales, lateral spots conspicuous and roundish, tail 0 138 to 0 157 of total length *A elegans elegans* (Kennicott)
(From about the 98th meridian in Texas, west through northeastern Mexico and New Mexico into south-eastern Arizona)

Scale rows, 27, only occasionally 29, dorsal blotches on body about 60 (54 to 77), narrow, covering about 7 to 10 lateral rows and $1\frac{1}{2}$ to 2 longitudinal rows of scales, and separated by about 2 scale lengths, lateral spots narrow or indistinct, tail 0 100 to 0 148 of total length *A elegans occidentalis* Blanchard
(Southeastern Arizona west through southern California and northern Lower California)

- 92 Pattern not of narrow cross-bands of black with the alternate bands mixed or split with red 93
Pattern of narrow cross-bands of black, the alternate bands mixed or split with red, ground color above slate-gray *Lampropeltis alterna* (Brown)
(Davis Mountains, Texas)

- 93 Color pattern without red and without dorsal blotches of brown or gray with black borders ⁴ 94
Pattern with red, or with dorsal blotches of brown, gray, or red, with black borders 105

⁴ The red fades to whitish in preservative, but it is sufficient, for the purpose of the key, to determine that the pattern is in two colors instead of in three

- 94 Pattern in rings, cross-bands, or stripes, or chiefly of scales white at base shading gradually into a black distal border, but not chiefly of sharply defined white or yellow spots on black scales 97
Scales chiefly black with sharply defined white or yellow spots (not light at base shading gradually into a dark distal border), these yellow spots often so grouped as to form 50 or more narrow cross-bands on body and tail 98
- 95 Scale rows on middle of body usually 21 96
Scale rows on middle of body 23 or 25, no light centers dorsally on the scales between the cross-bands, head mostly black
L. getulus splendida (Baird & Girard)
(Southeastern Arizona to 97th meridian, southern Texas, and northern Mexico)
- 96 A yellow spot on practically every dorsal scale
Speckled king snake *L. getulus holbrooki* (Stejneger)
(Eastern Texas to southeastern Wyoming, east to eastern Illinois, and south to the Gulf of Mexico)
Scales between the cross-bands without light centers or with only a very few small ones
L. getulus nigra (Yarrow)
(Eastern Illinois to Ohio, south to central Alabama)
- 97 Pattern neither of rings nor of longitudinal stripes, posterior chin-shields nearly as long and nearly as wide as anterior, in contact or separated by not more than one small scale 98
Pattern of rings, or of longitudinal stripes of white or yellowish, posterior chin-shields generally much shorter and narrower than anterior and separated by 1 or 2 small scales 100
- 98 Many dorsal cross-bands of white or yellow 99
No dorsal cross-bands distinguishable, dorsal scales light at base, shading gradually into a dark distal

- border *L. getulus brooksi* Barbour
(Extreme southern Florida)
- 99 Cross-bands fewer than 50, 21 (sometimes 23) rows
of scales Chain snake, king snake
L. getulus getulus (Linné)
(New Jersey to Mobile Bay and central Florida)
Cross-bands more than 50, or nearly indistinguish-
able, 23 (sometimes 21) rows of scales, scales be-
tween the cross-bands usually white at base
L. getulus floridana Blanchard
(Central and southern Florida)
- 100 Pattern of rings 101
A dorsal longitudinal stripe, complete or interrupted 103
- 101 White scales mostly brown at their bases, white bars
on prefrontals broad or narrow, lower labials, 9 or 10 102
White scales white to their bases, forming rings of uni-
form white, white bars on prefrontals broad, con-
vex behind, lower labials usually 9
L. getulus boylii (Baird & Girard)
(California, Nevada, southwestern Utah, northern
and western Arizona, and northern Lower Cali-
fornia)
- 102 White bars on prefrontals occupying less than half
the area of these plates, frontal plate uniform black,
or with the white restricted to a narrow transverse
bar at its anterior end, no white on parietals,
lower labials usually 9 *L. getulus yumensis* Blanchard
(Southern Arizona, extreme southeastern California,
northeastern Lower California and northwestern
Sonora)
White bars on prefrontals occupying more than half
the area of these plates, frontal plate with promi-
nent white markings, or at least with a central
spot of white, each parietal with one or more white

- spots, lower labials usually 10 *L. getulus conjuncta* (Cope)
(Southern Lower California)
- 103 Dorsal stripe white or yellow, sharply defined on a
dark brown or black ground color
L. californiae californiae (Blainville)
(Fresno County, California, to northern Lower California)
Dorsal stripe brownish 104
- 104 Dorsal stripe narrow, about 3 scales wide, of light
brown or cinnamon on a dark brown ground color
L. californiae nitida (Van Denburgh)
(Southern Lower California)
Dorsal stripe broad, about 5 scales wide, of dark
purplish brown, lateral scales yellowish white with
narrow purplish brown borders
L. catalinensis Van Denburgh
(Santa Catalina Island, Gulf of California)
- 105 Pattern of black-edged dorsal blotches of brownish or
dark red, only narrowly in contact with fifth row of
scales, or extending no lower than the sixth or
seventh rows 106
Pattern in rings, or, if in blotches or saddles of brown,
gray, or red, these broadly in contact with the fifth
or a lower row of scales 107
- 106 Scale rows, 25-27, dorsal blotches with concave an-
terior and posterior margins, lower labials, 9 or 10,
rarely 8 *L. calligaster* (Say)
(Western Texas to Mississippi, north to Indiana
and northwest to Minnesota, thence south to Texas)
Scale rows, 23 or 21 on middle of body, dorsal blotches
with straight or convex anterior and posterior mar-
gins, lower labials, 8, less often, 9 Brown king
snake *L. rhombomaculata* (Holbrook)
(Mobile to Knoxville, Tennessee, north to Mary-
land, and south to central Florida)

- 107 Whitish cross-bands on body and tail fewer than 40,
or if more than 40, snout not uniformly whitish 108
Whitish cross-bands on body and tail more than 40,
top of head black, snout uniformly white
L. pyromelana (Cope)
(Utah, Arizona, western New Mexico and northern
Mexico)
- 108 Whitish cross-bands usually distinctly widened on
first row of scales, or scale rows anteriorly not more
than 17 112
Whitish cross-bands little, if any, widened on the
lower rows of dorsal scales, and scale rows more
than 17 on anterior end of body 109
- 109 Whitish annuli usually more than 30, snout black
(Coral king snake *L. multicincta* (Yarrow)
(California)
Whitish annuli fewer than 30 110
- 110 Dorsal red areas usually continuous across the belly,
snout whitish, specked with black
L. triangulum amaura (Cope)
(Lower Mississippi Valley)
Spaces on belly between the yellow rings filled with
black, snout totally black, or only very slightly
lightened on top or sides 111
- 111 Yellowish rings, 19-25, black spaces on belly usually
longer than the intervening yellow ones
L. triangulum annulata (Kennicott)
(Plateau region of southern Mexico north to ex-
treme southern Texas)
Yellowish rings, 25-40, black spaces on belly usually
shorter than the intervening yellow ones
L. triangulum gentilis (Baird & Girard)
(South central Texas, to South Dakota, west into
Utah and Arizona)

- 112 Black of head practically restricted to posterior portion, or to various black-edged light markings 114
 Black practically uniform over head, except for snout region, which is more or less lightened, at least on the sides, scale rows anteriorly more than 17 113
- 113 Whitish annuli or cross-bands, 25-40, black often strongly encroaching upon the red on the mid-dorsal line *L. triangulum gentilis* (Baird & Girard) (South central Texas to South Dakota, west into Utah and Arizona)
 Whitish annuli or cross-bands, 18-25, black showing not more than a slight tendency to encroach upon the red areas on the mid-dorsal line
L. triangulum amaura (Cope)
 (Lower Mississippi Valley)
- 114 Usually two anterior temporals, scale formula very rarely lower than 19-21-19-17 (Fig 31) 116
 Usually single anterior temporal, scale formula generally 17-19-17, rarely higher than 19-17 (Fig 32) 115

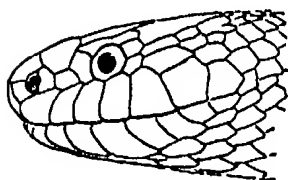


FIG 31

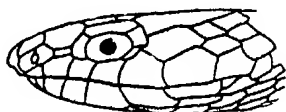
Lampropeltis triangulum triangulum

FIG 32

Lampropeltis elapsoides elapsoides

- 115 Red areas continuous across the belly Scarlet king snake *L. elapsoides elapsoides* (Holbrook) (North Carolina and Kentucky, south to New Orleans and throughout Florida)
 Red not continuous across the belly, but restricted to black-bordered dorsal saddles that extend upon the ventrals *L. elapsoides virginiana* Blanchard (Northern North Carolina to Delaware)

- 116 Whitish cross-bands, 23-60, pattern of dorsal saddles or blotches of red or brown 117
 Whitish annuli or cross-bands, 18-30, pattern of body practically in rings *L. triangulum amaura* (Cope)
 (Lower Mississippi Valley)
- 117 Dorsal saddles, 35-60, reaching down to the fifth or third row of scales, often two rows of lateral alternating blotches, a dark band on posterior portion of prefrontals, a black-bordered light band from the eye to angle of mouth, usually a Y-shaped light spot on back of head Spotted adder, milk snake
L. triangulum triangulum (Lacépède)
 (Eastern United States and southern Canada)
 Dorsal saddles 23-35, extending down to the third row of scales, or lower, only one series of alternating spots, head markings of *triangulum* only partially or not at all developed *L. triangulum sypsla* (Cope)
 (Southern Indiana to Minnesota, south to central Arkansas and west to central Kansas)
- 118 Scale rows, 17 Drymarchon 119
 Scale rows, 19 120
- 119 Nearly entirely black, sixth upper labial (or the one behind eye) not in contact with lower anterior temporal, the two adjacent labials meeting in a suture above it Indigo snake (Fig 33)
D. corais couperi (Holbrook)
 (Southeastern Georgia and Florida to southwestern Alabama)
 Color generally brown to light brown anteriorly, lighter on belly, posterior part of body with tail, black, upper labial behind eye (usually sixth) generally in contact with lower anterior temporal, or with a small scale cut off from it (Fig 34)
D. corais melanurus (Dumeril & Bibron)
 (Southern Texas into Central America)

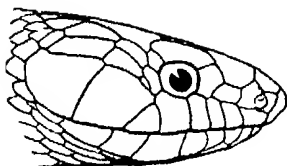


FIG 33
Drymarchon corais couperi

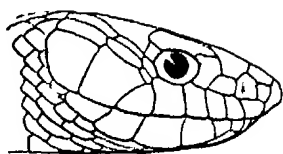


FIG 34
Drymarchon corais melanurus

- 120 Loreals, 1-4, parietal separated from upper labial by anterior temporal (Fig 35) 121
No loreal, parietal in contact with upper labial (Fig 36) *Stylophis extenuatus* (Brown)
(Central to northern Florida)

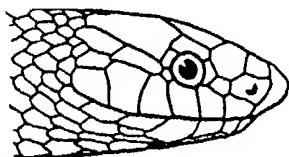


FIG 35 *Cemophora coccinea*



FIG 36 *Stylophis extenuatus*

- 121 One or two preoculars, eye in contact with upper labials (Fig 35) *Cemophora coccinea* (Blumenbach)
(Maryland to Louisiana, north to southern Tennessee, and south through Florida)
Three preoculars, eye separated from upper labials by small scales *Phyllorhynchus* 122
- 122 About 11 to 13 dorsal spots on body, and no lateral spots *P browni* Stejneger
(Southern Arizona)
About 25 to 45 dorsal spots on body, and one or two rows of lateral spots *P decurtatus* (Cope)
(Southwestern Arizona, southern California and Lower California)

- 123 Scale rows fewer than 19 124
Scale rows, 19 or more 179

124 Loreal present (Figs 37, 38)

125

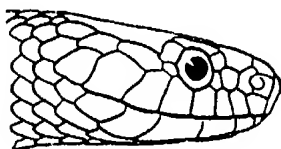


FIG 37

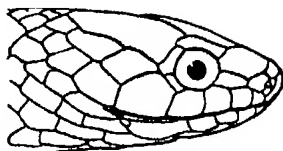
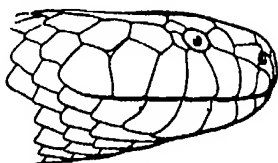
Diadophis punctatus edwardsii

FIG 38

Virginia valeriae valeriae

No loreal (Fig 39)

169

FIG 39 *Micrurus fulvius*

- 125 One or more preoculars present (Fig 37) 129
 No preocular, loreal and prefrontal in contact with
 eye (Fig 38) 126
- 126 Scale rows, 13, upper labials, 5, nasal plate entire
 Worm snake Carphophis 127
 Scale rows more than 13, upper labials six, nasal
 divided Virginia 23
- 127 Color above generally brown, light color of belly ex-
 tending onto first or second row of dorsal scales,
 commonly 2 temporal plates behind the first 128
 Color above generally gray or black, light color of
 belly extending usually onto the third row of dorsal
 scales, commonly only a single temporal behind the
 first *Carphophis amoena vermis* (Kennicott)
 (Southeastern Nebraska and central Missouri south
 through eastern Oklahoma, Arkansas and Louisiana)
- 128 Internasals and prefrontals usually separate (Fig 40)
C amoena amoena (Say)

(Connecticut, and Albany County, New York, south to central Florida, and west into the Appalachian Mountains)

Internasals and prefrontals usually united into two large shields (Fig 41) *C amoena helenae* (Kennicott)
(From Central Illinois south through Mississippi and east to northwestern Alabama, the Tennessee Valley in eastern Tennessee, and eastern Ohio)

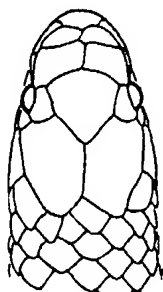


FIG 40
Carphophis amoena amoena

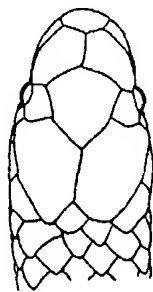


FIG 41
Carphophis amoena helenae

129 Two or three preoculars (Fig 42)
A single preocular (Fig 43)

•
•

130
162

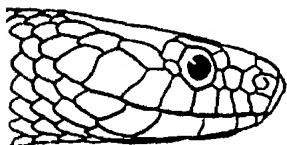


FIG 42 *Diadophis punctatus edwardsi*

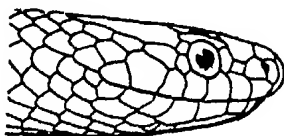


FIG 43 *Contia tenuis*

130 Rostral normal (Fig 44) 132
Rostral widened laterally with projecting edges, and curved backwards over snout (Fig 45) Patch-nosed snakes
Salvadora 131

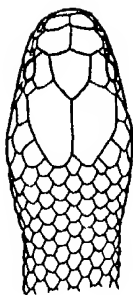


FIG 44

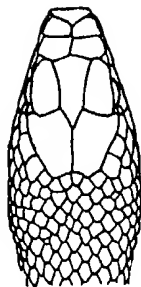
Diadophis punctatus edwardsi

FIG 45

Salvadora grahamiae grahamiae

- 131 Posterior pair of chin-shields in contact or separated by one small scale, upper labials usually 8, lower labials usually 9, first pair of lower labials meeting in a suture of normal length (Fig 46)

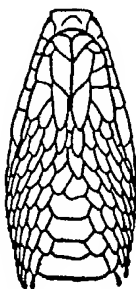
S. grahamiae grahamiae (Baird & Girard)

(Southern and western Texas and eastern New Mexico, south to the Isthmus of Tehuantepec)

- Posterior pair of chin-shields separated by 2 small scales, upper labials, 9 or 10, lower labials, 10 or 11, first pair of lower labials elongated posteriorly, forming an unusually long suture

S. grahamiae hexalepis (Cope)

(Western New Mexico, Utah, Arizona, Nevada, southern California, Lower California and north-western Mexico)

FIG 46 *Salvadora grahamiae grahamiae*

- 132 Usually 2 or 3 anterior temporals, lower preocular very small, wedged between the adjacent upper labials Racers and whip snakes (Fig 47) 145

A single anterior temporal, lower preocular moderate in size, not wedged between the adjacent upper labials (Fig 48) 133

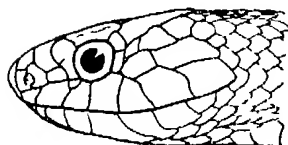


FIG 47

Coluber constrictor flaviventris

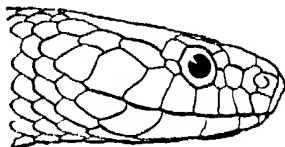


FIG 48

Diadophis punctatus eduardsoni

- 133 Usually a neck ring and often black spots on ventral scales, color above not grass-green, nasal plate divided Ringneck snakes *Diadophis* 134

No neck ring and no black spots on ventral scales, color above, grass-green, nasal plate not divided Smooth green snake, grass snake

Liopeltis vernalis (Harlan)

(North Dakota to Nova Scotia, south through Pennsylvania, Ohio and Indiana, thence west into Utah, and south through New Mexico, the Texas Panhandle, and Oklahoma)

- 134 Ventral color extending, on anterior portion of body, onto one or more of lowermost rows of dorsal scales, ventral plates usually more than 180 138

Ventral color not extending onto lowermost row of dorsal scales, ventral plates usually fewer than 180 135

- 135 Black spots on belly in a single median row, or nearly or quite absent (very rarely irregular), upper labials usually 8 137

Black spots on belly numerous, and scattered or irregular, upper labials, 7 (only rarely 8) 136

- 136 Ventrals in males more than 145, in females, more than 150, scale rows, 17-17, or 17-15 (occasionally only 15), belly spots scattered or in two's, generally clean-cut in appearance

Diadophis punctatus arnyi (Kennicott)

(Western Illinois, Iowa, Missouri, northwestern Arkansas, west to the Great Plains and south into Texas)

- Ventrals in males fewer than 145, in females, fewer than 150, scale rows 15 throughout, belly spots showing tendency to fuse into a single row, or irregularly massed *D punctatus strictogenys* Cope
(Southern Illinois through the lower part of the Mississippi Valley to the Gulf)

- 137 Sum of ventrals and caudals usually less than 191, belly with a series of large half-circular black spots along the median line, neck ring usually partially or wholly interrupted on the mid-dorsal line

D punctatus punctatus (Linné)

(Eastern Alabama, north to southern Virginia, and south throughout Florida)

- Sum of ventrals and caudals usually more than 191, belly usually immaculate, but sometimes with a median series of small black spots, more or less imperfectly developed, neck ring only rarely interrupted on the mid-dorsal line

D punctatus edwardsii (Merrem)

(Wisconsin to the southern Appalachians and north into Canada),

- 138 Ventrals in males fewer than 206, in females, fewer than 220 140
Ventrals in males more than 206, in females, more than 220 139

- 139 Neck ring present, 2 to 4 scales in width

D regalis arizonae Blanchard

(Central Arizona, south into Sonora)

Neck ring absent, or much reduced

D. regalis regalis (Baird & Girard)

(Central Texas to southeastern Arizona)

- 140 Scale rows, 17-15 (rarely 15-15) 141
 Scale rows, 15-15 or 15-13 (rarely 17-15 or 15-17-15) 142
- 141 Ventral color not covering more than three-fourths of the lowermost row of dorsal scales, belly usually conspicuously spotted with black
D. amabilis modestus (Duméril and Bocourt)
 (San Bernardino Mountains, Los Angeles County, and Santa Catalina Island, California)
 Ventral color covering from $1\frac{1}{2}$ to 2 of the lowermost rows of dorsal scales, belly usually only lightly spotted with black *D. amabilis vandenburgi* Blanchard
 (Ventura to Santa Cruz counties, California)
- 142 Ventral color covering usually more than two-thirds of the first row of dorsal scales 143
 Ventral color covering from one-third to two-thirds of the lowermost row of dorsal scales, neck ring only rarely interrupted, color above usually olive or bluish slate *D. amabilis similis* Blanchard
 (Southwestern San Bernardino County, California, south into the San Pedro Martir Mountains)
- 143 Neck ring from 1 to $1\frac{1}{2}$ scales in width, often interrupted, ventral color covering from $\frac{1}{2}$ to $1\frac{1}{2}$ rows of dorsal scales, belly well sprinkled with small black spots, dorsal color usually dark
D. amabilis amabilis (Baird & Girard)
 (San Francisco Bay and the San Joaquin and Sacramento River valleys, California)
 Neck ring from $1\frac{1}{2}$ to 3 scales wide, not interrupted, ventral color covering from $1\frac{1}{2}$ to 2 or more rows of dorsal scales, belly never heavily spotted with black

- 144 Two lowermost rows of dorsal scales flecked with black, belly rather conspicuously, although sparsely, marked with small black dots

D. amabilis occidentalis Blanchard

(Sonoma County north through Humboldt County, California, to the Columbia River)

- Two lowermost rows of dorsal scales unicolor (not flecked with black), belly almost or quite unspotted

D. amabilis pulchellus (Baird & Girard)

(Western slopes of the Sierra Nevada, south, perhaps to Tijon Pass in California, and north to southern Oregon)

- 145 Scale rows 15 at posterior end of body (scale formula 17-15 or 15-15) *Coluber* 146

Scale rows 13 or 11 at posterior end of body (scale formula 17-13, 15-13, or 15-11) *Masticophis*^b 148

- 146 Black or very dark gray above, dark gray below, caudals average 106 Black snake

Coluber constrictor constrictor (Linné)

(Eastern United States west to central Indiana, thence southwest through southern Illinois and eastern parts of Missouri, Arkansas and Texas)

- Blue-gray, olive-brown or greenish above, below, light bluish, greenish, or yellow, caudals average 82 or 87 147

- 147 Upper labials, 7, caudals average 82, color above blue-gray or blue Blue racer

C. constrictor flaviventris (Say)

(From Rocky Mountains east through Texas, western Arkansas, Missouri and Michigan, and northern parts of Illinois, Indiana and Ohio)

- Upper labials usually 8, caudals average 87, color above olive-brown, green, or blue-gray

C. constrictor mormon (Baird & Girard)

(West of the Rocky Mountains)

^b The species here segregated under *Masticophis* are by most authors assigned to *Coluber*. See remarks on page ix.

- 148 Scales in 15 rows 149
Scales in 17 rows 152
- 149 Head plates with light edges 151
Head plates not light-edged — uniform olive-brown 150
- 150 Two to 4 dark and 2 light lateral stripes
Masticophis schotti (Baird & Girard)
(Eagle Pass, Texas)
A single light lateral stripe or none
M. ruthveni Ortenburger
(Vicinity of Brownsville, Texas, and northeastern
Tamaulipas, Mexico)
- 151 No light cross-band across neck Western striped racer
M. taeniatus taeniatus (Hallowell)
(Idaho and southern Oregon south to central Mexico,
west to the Sierra Nevada, and east to Texas)
One or several light cross-bands just behind head or
on neck and body
M. taeniatus girardi (Stejneger & Barbour)
(Western Texas)
- 152 Pattern of one or more distinct longitudinal stripes,
which may or may not be interrupted anteriorly 153
No distinct longitudinal stripes present, pattern, if
any, of dark cross-bands 156
- 153 Dark lateral stripe on second and third scale rows
interrupted at intervals of 5-7 scales by light areas
M. aurigulus (Cope)
(Extreme southern Lower California)
Dark lateral stripe not interrupted at intervals by
light areas 154
- 154 Lateral light stripes uniform in width 155
Lateral light stripe enlarged at intervals of 4-7 scales
M. barbouri (Van Denburgh)
(Espiritu Santo Island, Gulf of California)

- 155 Two or three lateral light stripes anteriorly, not continued to tail Sonoran Racer *M semilineatus* (Cope)
(Southern Arizona, south through all the coast states of Mexico to Oaxaca)
- A single light line along scales of third and fourth lateral rows, continuing to tail *M lateralis* (Hallowell)
(California west of the Sierra Nevada and south into Lower California)
- 156 Dorsal surface of body and tail not all black 157
Entire dorsal surface of body and tail black (Juvenile coloration not known) Black whip snake
M piceus (Cope)
(California to eastern Arizona and Lower California)
- 157 Black or dark-brown cross-bands present across neck or body 160
No black cross-bands present 158
- 158 No elongate blackish spots irregularly scattered on dorsal scales 159
Elongate blackish spots on dorsal scales irregularly scattered, these spots not longer than a single scale
M anthonyi (Stejneger)
(Clarion Island, Gulf of California)
- 159 Head and anterior portion of body a uniform very dark brown, gradually becoming much lighter posteriorly (Adults) Coach-whip snake
M flagellum flagellum (Shaw)
(Southeastern, United States west to eastern Texas, Oklahoma and Kansas)
- Anterior portion of body not darker than the posterior (Adults) Whip snake
M flagellum flavigularis (Hallowell)
(Texas, except eastern fourth, western Oklahoma, western Kansas, Colorado, New Mexico, and south into the central plateau of Mexico)

- 160 Through loreal plate a distinct white stripe bordered by black Western whip snake
M. flagellum frenatus (Stejneger)
 (Western New Mexico and Colorado, west to the coast, including Lower California)
 No distinct white stripe through loreal plate 161
- 161 Dark brown cross-bands on neck separated by 1-2 scales of lighter brown, most of last upper labial cream in color (juveniles) Coach-whip snake
M. flagellum flagellum (Shaw)
 (Southeastern United States west to eastern Texas, Oklahoma and Kansas)
 Dark brown cross-bands on neck separated by 3 or more scales of light brown, all but anterior lower corner of last upper labial brown (Juveniles)
 Whip snake *M. flagellum flavigularis* (Hallowell)
 (Texas, except eastern fourth, western Oklahoma, western Kansas, Colorado, New Mexico, and south into the central plateau of Mexico)
- 162 Scale rows less than 17 163
 Scale rows, 17 168
- 163 Color not grass-green, posterior chin-shields much shorter than anterior chin-shields, caudals 30-60 164
 Color grass-green, posterior chin-shields longer than, or about as long as, anterior chin-shields, caudals 70-100 Smooth green snake, grass snake
Liopeltis vernalis (Harlan)
 (North Dakota to Nova Scotia, south through Pennsylvania, Ohio and Indiana, thence west into Utah, and south through New Mexico, the Texas Panhandle, and Oklahoma)
- 164 Belly uniformly light or crossed by numerous black bands that encircle the body, no light line on fourth or fifth row of scales, nasal plate usually entire (Fig 49) Sonora 165

Each ventral with a conspicuous black anterior border, light line generally evident on the fourth or fifth row of scales, tail generally with few or no black markings below, nasal plate usually divided below the nostril (Fig 50)

Contia tenuis (Baird & Girard)

(Vancouver Island, south to the southern end of the Sierra Nevada)

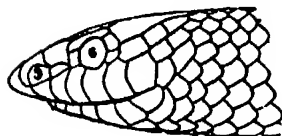


FIG 49 *Sonora occipitalis*

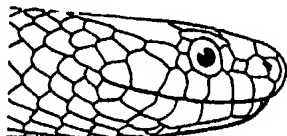


FIG 50 *Contia tenuis*

- 165 Scale rows, 15, ventrals, 138 179 166
Scale rows, 13, ventrals, 126-137

Sonora taylori (Boulenger)

(Southern Texas and northeastern Mexico)

- 166 Pattern of black rings, the posterior of which encircle the body, scale formula, 15-15

S. occipitalis (Hallowell)

(Boulder, Colorado, southern Utah, western Arizona, and deserts of southeastern California)

Black rings, if present, not encircling the body, scale formula more commonly 15-14

167

- 167 Pattern of 17 to 40 black cross-bands on body

S. semiannulata Baird & Girard⁶

(From about the 97th meridian in Texas, Oklahoma, and Kansas, west through Arizona and into Nevada)

General color brown above, without black cross-bands, sometimes with a pale mid-dorsal light line

S. episcopa (Kennicott)⁷

⁶ *S. semiannulata* and *S. episcopa* may be color-phases of the same species See Ortenburger, *Copeia*, No 120, p 79

⁷ See note 6

(Central Oklahoma and Texas, west into south-eastern California, north to southern Idaho, and south throughout Lower California)

- 168 Light brown above, a dark line from rostral through eye to middle of last upper labial, internasals truncate in front, upper labials, 7, caudals more than 60
Leimadophis flavilatus (Cope)

(North Carolina to Florida and Mississippi)

- Dark brown or black above, no line from rostral to last upper labial, internasals nearly pointed in front, upper labials usually 8, caudals fewer than 60
Seminatrix pygaea (Cope)

(North Carolina through Florida)

- 169 Scale rows more than 13 172
Scale rows, 13 *Chilomeniscus* 170

- 170 Numerous black cross-bands or rings on body, rostral in contact with prefrontals, separating internasals, 13, rarely 12, rows of scales at posterior end of body (Fig 51) 171

- No black cross-bands, each dorsal scale except in the two lower rows, with a black point, rostral generally separated from prefrontals by internasals, 12 rows of scales at posterior end of body (Fig 52)

C. stramineus Cope

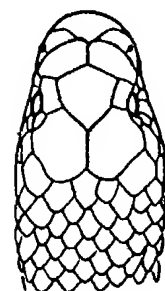


FIG 51 *Chilomeniscus cinctus*

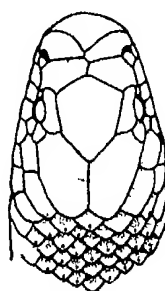
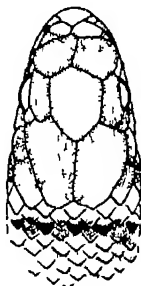


FIG 52 *Chilomeniscus stramineus*

- 171 Cross-bands or rings about 17 to 23 on body, 3 to 5 on tail *C. cinctus* Cope
(Southeastern California and Arizona, south through Lower California and northwestern Mexico)
Cross-bands on body about 32, on tail about 7
C. punctatissimus Van Denburgh & Slevin
(Espiritu Santo and Magdalena islands, Lower California)
- 172 Scale rows, 15, rostral normal 173
Scale rows, 17, rostral acute, elevated at tip, its upper surface concave, separating the small internasals and broadly in contact with the prefrontals, posterior teeth in upper jaw not enlarged and grooved, pattern of about 30 transverse blotches of brown *Ficimia cana* (Cope)
(Western Texas to Arizona)
- 173 Coloration above uniform except near head, ventral plates fewer than 190, grooved fangs in posterior part of upper jaws Tantilla 174
Coloration in rings of black, yellow, and red, ventral plates more than 200, grooved fangs in anterior part of upper jaw Elapidac Micrurus 185
- 174 On neck a light cross-band bordered behind with a dark band (Fig 53) 175
On neck no light cross-band bordered behind with black (Fig 54) 176

FIG 53 *Tantilla coronata*FIG 54 *Tantilla nigriceps*

- 175 Light band involving tips of parietals, ventrals about 132-154, 2 postoculars (Fig 53) 176
 Light band separated from parietals by 3 or 4 dorsal scales, ventrals about 172-182, usually 1 postocular
Tantilla eiseni Stejneger
 (From Fresno County, California, to northern Lower California)
- 176 Posterior dark border of light band broad, i e, 3 or 4 scales wide, ventrals about 130-143 (Fig 53)
T coronata (Baird & Girard)
 (Southeastern states, west into Mississippi and north through central and western Tennessee)
 Posterior dark border of light band narrow, i e, 1 to $1\frac{1}{2}$ scales wide, ventrals about 155 (Fig 55)
T wilcoxi Stejneger
 (Southeastern Arizona)

FIG 55 *Tantilla wilcoxi*

- 177 Head black, upper labials, 7, 2 postoculars, ventrals 136-161 (Fig 54) 178
 Head brown, but little darker than body color, upper labials, 6, 1, rarely 2, postoculars, ventrals, 111-133
T gracilis Baird & Girard
 (Central Missouri and eastern Kansas, south through Arkansas, Oklahoma and Texas)
- 178 Black of head extending over from 1 to 4 transverse rows of dorsal scales (Fig 54) *T nigriceps* Kennicott

(Central and southern Texas, north into Kansas,
west to southwestern Utah, south through Arizona
and probably into northern Mexico)

Black of head extending over 5 or 6 transverse rows of
dorsal scales *T planiceps* (Blainville)
(Southern Lower California)

- 179 One or more preoculars (Fig 56) 180
No preocular, loreal in contact with eye (Fig 57) 182

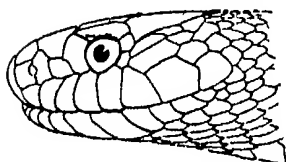


FIG 56 *Elaphe vulpina*

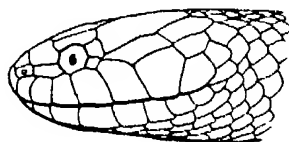


FIG 57 *Farancia abacura*

- 180 Pupil round, head but slightly wider than neck, only
a single preocular (Fig 56) 181
Pupil vertically elliptical, head distinctly wider than
neck, two or three preoculars (Fig 58) 183

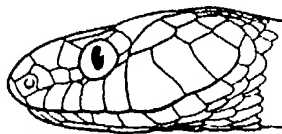


FIG 58 *Leptodeira septentrionalis*

- 181 Scale rows, 25-33, posterior teeth in upper jaw not
enlarged and not grooved *Elaphe* 44
Scale rows, 19, posterior teeth in upper jaw enlarged
and grooved, pattern of two broad light stripes on
either side of the mid-dorsal line (or these largely
suffused with brown), rest of dorsal surface brown,
belly light and immaculate, or specked with black
Comophanes imperialis (Baird)
(Extreme southern Texas to Guatemala)

- 182 Dark above, no stripes or spots, red of belly usually extending onto 2 or 3 lower rows of scales at regular intervals, a single internasal, usually 8 lower labials (Figs 57, 59) Horn snake

Farancia abacura (Holbrook)

(Virginia to Florida and eastern Texas, north in the Mississippi Valley to southern Indiana)

- Brown above, a light stripe on the sixth or seventh row of scales on each side and one on the mid-dorsal row, belly with two lateral and usually a median row of dark spots, distinguishable at least anteriorly, two internasals, usually 9 or 10 lower labials Rainbow snake

Abastor erythrogrammus (Daudin)

(Coastal regions from southeastern Virginia to northern Florida and Alabama)

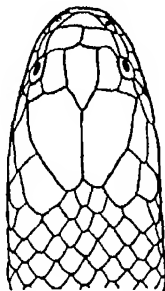


FIG 59 *Farancia abacura*

- 183 Upper labials, 8, 1 loreal, 2 postoculars, a single anterior temporal (Fig 58)

184

- Upper labials, 9, usually 2 loreals, 3 or 4 postoculars, 2 or 3 anterior temporals, posterior teeth of upper jaw enlarged and grooved, about 21-32 double dorsal blotches on body *Trimorphodon lyrophanes* (Cope)
(Southern Arizona, southern California, Lower California, and probably northwestern Mexico)

- 184 A considerable number of small dorsal blotches with

one or two series of smaller alternating spots on sides, 21 rows of scales, posterior teeth of upper jaw not grooved *Hypsiglena ochrorhynchus* Cope
(Central Texas to northern Utah and San Francisco Bay, south throughout Lower California and to central Mexico)

About 22-26 large dorsal blotches, sometimes more or less confluent, without lateral alternating spots, scale rows, 23, occasionally 21, posterior teeth of upper jaw grooved (Fig 58)

Leptodeira septentrionalis (Kennicott)
(Extreme southern Texas to Honduras)

- 185 A black ring followed by a yellow one immediately behind head, black of head extending back only onto anterior ends of parietals, dorsal red areas usually strongly spotted with black, and often interrupted on belly by a large black spot, usually 3 or 4 black rings on tail, caudals, 28-45

Micrurus fulvius (Linné)
(Eastern North Carolina, south through Florida, west through Alabama to southeastern Missouri, south through eastern Texas to Panama)

A yellow followed by a red ring immediately behind head, black of head extending back beyond middle of parietals, dorsal red areas little if at all spotted with black, and not at all or but slightly marked with black on the belly, 2 black rings on tail, caudals, 21-29 *M. euryzanthus* (Kennicott)
(Southern Arizona, northern Mexico, and Tiburon Island, Lower California)

- 186 A rattle on end of tail (Fig 60) 188
No rattle on end of tail (Fig 61) *Agkistrodon* 187



FIG 60 *Sistrurus catenatus*



FIG 61 *Agkistrodon mokasen*

- 187 No loreal, supralabials in contact with orbit, scale rows, 25, a pair of post-parietals Water moccasin, cotton-mouth (Fig 62) *A. piscivorus* (Lacépède)
(Lowlands from southeastern Virginia through Florida, north in the Mississippi Valley to southeastern Missouri and southern Illinois, west to central Texas and up the Rio Grande to the Pecos River)
Loreal present, orbit separated from supralabials by scales, scale rows usually 23, no post-parietals (Fig 63) Copperhead *A. mokasen* Beauvois
(Southern New Hampshire to central Illinois, west to middle Kansas and the Texas Panhandle, and south through Texas and northern Florida)

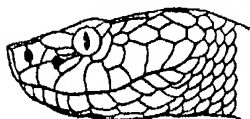


FIG 62 *Agkistrodon piscivorus*
(from Stejneger)

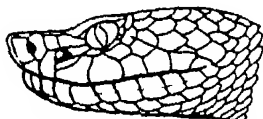


FIG 63 *Agkistrodon mokasen*
(from Baird)

- 188 Top of head with large plates arranged symmetrically (Fig 64) *Sistrurus* 189
Top of head with small scales, mostly unsymmetrical (Fig 65) *Crotalus* 191

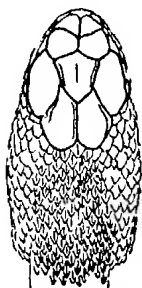


FIG 64
Sistrurus catenatus catenatus

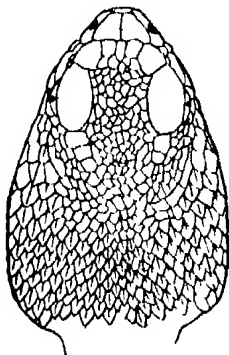


FIG 65
Crotalus horridus (from Baird)

- 189 Prefrontals not in contact with the loreal proper
(lower loreal, if two be present), a whitish stripe
from posterior nasal below eye to angle of mouth 190
Prefrontals in contact with loreal proper, a whitish
stripe from below center of eye to angle of mouth
Sistrurus miliaris (Linné)
(Southeastern North Carolina, south throughout
Florida, west through eastern Texas and Oklahoma,
and north through Arkansas to southern Missouri)
- 190 Scale rows usually 25 Massasauga
S. catenatus catenatus (Rafinesque)
(Southern peninsula of Michigan, Ontario, and west-
ern New York, southwest to Kansas)
Scale rows usually 23
S. catenatus edwardsii (Baird & Girard)
(Western Kansas, south through western Texas,
and west to southeastern Arizona)
- 191 Anterior nasal in contact with rostral (Fig 66) 192
Anterior nasal separated from rostral by small scales
(Fig 67) Bleached rattlesnake
Crotalus mitchelli (Cope)
(Arizona, southeastern California, and Lower Cal-
ifornia)



FIG 66 *Crotalus* sp
(from Stejneger)

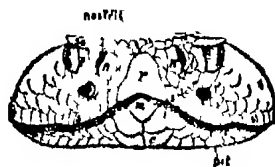


FIG 67 *Crotalus mitchelli*
(from Stejneger)

- 192 Upper preocular large, wider than high (Fig 68) 193
Upper preocular small and higher than wide or about
square, a pattern of about 16-18 transverse black-

ish bands usually distinguishable, general color greenish (Fig 69) Green rattlesnake

C. lepidus (Kennicott)

(Border region in Texas, New Mexico, southeastern Arizona and adjacent Mexico)



FIG 68 *Crotalus* sp
(from Stejneger)

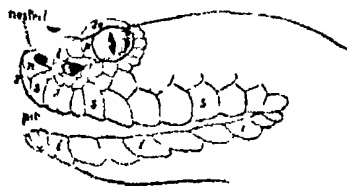


FIG 69 *Crotalus lepidus*
(from Stejneger)

193 External border of supraocular not produced into a horn-like process (Fig 70)

194

External border of supraocular produced into a horn-like process (Fig 71) Sidewinder, horned rattlesnake

C. cerastes Hallowell

(Southern California, southern Nevada, Arizona, southwestern Utah and northeastern Lower California)

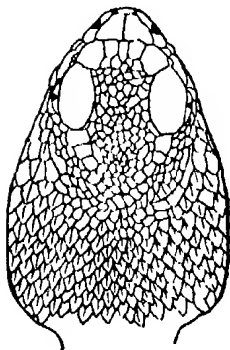


FIG 70 *Crotalus horridus*
(from Stejneger)

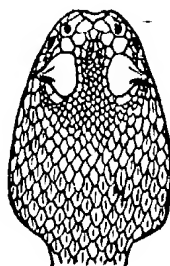


FIG 71 *Crotalus cerastes*
(from Stejneger)

- 194 Eye separated from upper labials by 2-5 rows of small scales, upper labials more than 9 (Fig 68) 195
 Eye separated from upper labials by a single row of small scales, upper labials, 9, a dorsal pattern of numerous small blotches, often broken into two's
C pricei Van Denburgh
 (Southeastern Arizona and adjacent region in Mexico)
- 195 Pattern not essentially of short transverse bands of white 196
 A dorsal pattern of about 19-23 more or less obscure short transverse bands of white, narrowly edged with black, general color above light olive-brown
C willardi Meek
 (Northwestern Mexico to the Santa Rita Mountains, Arizona)
- 196 Dark spots on back solid, or with only one median light spot 197
 Dark spots on back with two symmetrical light spots, one on each side of median line, tail nearly uniformly black
C molossus Baird & Girard
 (Western Texas to southern Arizona, northern Mexico, and San Esteban Island, Gulf of California)
- 197 Dorsal pattern consisting of more or less squarish spots or straight cross-bands 198
 Dorsal pattern consisting of dark chevron-shaped bands
C horridus (Linné)
 (Maine to Georgia, westward to Great Plains)
- 198 Rostral at least as high as wide (Fig 72) 200
 Rostral wider than high (Fig 73)* 199

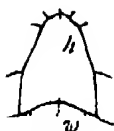


FIG 72

Diagram of high rostral
(from Stejneger)



FIG 73

Diagram of low rostral
(from Stejneger)

- 199 Keels on all the body scales, except sometimes the first row, head scales nearly smooth, colors pale, lateral angles of dorsal hexagons without black apex

C. tigris Kennicott

(Southern California, southern Nevada and southern Arizona)

- Four or 5 rows of smooth scales on each side, head scales strongly keeled, colors bright, lateral angles of dorsal hexagons with black apex *C. enyo* (Cope)
(Extreme southern Lower California)

- 200 Light post-superciliary line reaching second scale row above mouth at least two scales anterior to angle of mouth (Fig 74)

202

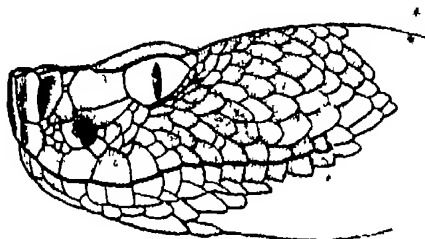


FIG 74 *Crotalus adamanteus* (from Stejneger)

- Light post-superciliary line reaching second scale row above angle of mouth, or not at all (Figs 75, 76)

201

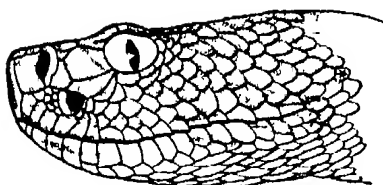


FIG 75

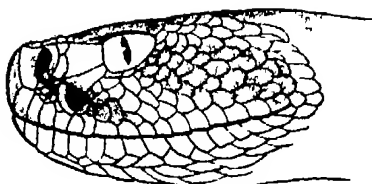
Crotalus confluentus (from Stejneger)

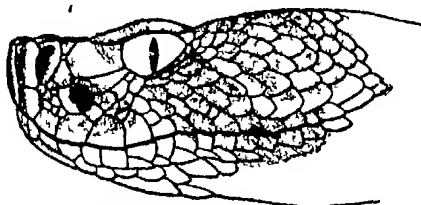
FIG 76

Crotalus oreganus (from Stejneger)

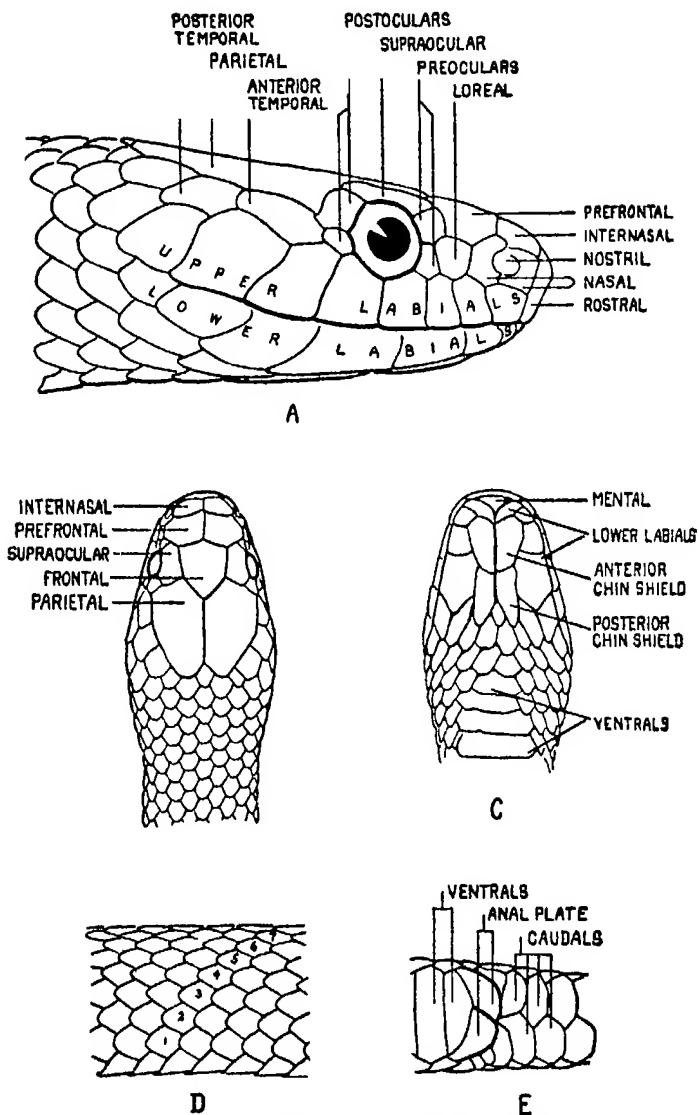
- 201 Light post-superciliary line one scale wide, dark postocular patch starting from below anterior edge of eye *C. confluentus* Say
(Great Plains from 96th meridian to Rockies, and from southern Canada to Texas)

Light post-superciliary line two scales wide, dark postocular patch starting from below center of eye
C. oreganus Holbrook
(British Columbia to southern California, western Idaho and Nevada and northwestern Lower California)

- 202 No white line on first labial and nasal, which are uniform in color and more or less dusted over with minute blackish dots 203
A well defined vertical white line on first labial and anterior nasal, occupying the posterior half of the latter (Fig 77) *C. adamanteus* Beauvois

FIG 77 *Crotalus adamanteus* (from Stejneger)

- (Southern North Carolina to Florida, westward to Louisiana)
- 203 Dorsal rhombs only imperfectly or not at all outlined with light borders, sides without definite markings 204
- Dorsal rhombs enclosed by continuous yellow borders, sides clouded or blotched with brown, more or less indefinitely outlined with light yellow or white
- C. atrox lucasensis* (Van Denburgh)
- (Southern Lower California)
- 204 First supralabial usually not divided, general coloration grayish or brownish, markings less definite, more punctulate, dorsal blotches usually not completely surrounded by light margins 205
- First supralabial usually divided transversely, general coloration reddish, pinkish, or yellowish *C. exul* Garman
- (Southern and Lower California, except the Cape Region, Cerros Island and islands in the Gulf of California)
- 205 Dorsal rhombs usually not enclosing light lateral areas
- C. atrox atrox* (Baird & Girard)
- (Texas and northern Mexico to Arizona and north-eastern Lower California)
- Dorsal rhombs usually enclosing light lateral areas as pale as the ground color
- C. tortugensis* Van Denburgh & Slevin
- (Tortuga Island, Gulf of California)

FIG 78 *Diadophis punctatus edwardsii*

GLOSSARY

Anal plate — The scale lying just in front of the anus, sometimes a single large scale ("anal entire," or "anal undivided"), sometimes divided obliquely into two scales ("anal divided") See Fig 78E

Body — From head to anus

Caudals — Large scales on under side of tail, usually in two series (divided, Fig 78E), but in some snakes in only a single series (entire)

Caudal scales — See Caudals

Chin-shields — Paired, elongated scales on chin between lower labials, usually two pairs, an anterior and a posterior (Fig 78C), but the posterior pair is, in a few snakes, greatly reduced

Fang — A tooth of the upper jaw with a lengthwise groove on its anterior edge, or with a canal opening on the anterior face of the tooth near its tip A fang is usually decidedly larger than the ungrooved teeth accompanying it

Frontal — A median, unpaired plate on top of head between eyes (Fig 78B)

Internasals — Two plates (in a few snakes only one) on top of head just behind rostral (Fig 78B)

Keel — A median longitudinal ridge on a scale (Fig 9)

Labials, lower — A row of scales bordering the lower jaw on each side and separated from one another at the anterior tip of the jaw by a mental scale (Fig 78A, C)

Labials, upper — A row of scales bordering the upper jaw on each side, and separated from each other at the anterior point of the head by the rostral plate (Fig 78A)

Loreal — A small scale lying between the nasal scale and the preoculars (Fig 78A)

Nasal — The scale in which the nostril lies The nasal is said to be "entire" when the nostril is in the center of a large scale, and "divided" when it lies between two squarish scales, or largely in one of them (Fig 78A) In the latter case the anterior half is called the "anterior nasal" and the posterior half the "posterior nasal"

Nasal plate — See Nasal

Nostril — A lateral pit on anterior portion of head on each side (Fig 78A)

Parietals — Two large plates on top of head posteriorly (Fig 78A, B)

Postocular — One or more small scales directly behind eye (Fig 78A)

Prefrontals — Two scales (four in *Pituophis*) on top of anterior part of head just in front of the unpaired frontal plate (Fig 78A B)

Preocular — One or more small scales directly in front of eye (Fig 78A) If the scale in this position is much longer than high, it is called the loreal, in which case the preocular is absent (Fig 22)

Rostral — A plate of varying shape at extreme anterior point of head above mouth (Fig 78A)

Scale rows — The lines of dorsal scales, counted obliquely (Fig 78D) The number may vary from one end of the body to the other, but the maximum number is always meant (unless otherwise stated), and this is determined by counting the rows somewhat anterior to the middle of the body, or by making several such counts Scale rows, or scale formula, 19-21 17, means 19 rows at anterior end of body, a maximum of 21 rows, near the middle, and a minimum of 17 rows, at the posterior end By a "higher" formula is meant one showing a greater number of scale rows Thus, 23-19 is a higher formula than 21-17, and the latter is higher than 19-17 A "lower" formula than the last would be such a one as 19-17 or 17-19-15

Sex — Sex is definitely determined by dissection of under side of tail behind anus A slit an inch or less in length will reveal, in the male a hollow, spiny organ lying ventral to the scent gland, in the female, only the scent gland will be found here Sex is often also determinable by the shape of the base of the tail, which is wide in the male, narrow and more quickly tapering in the female

Suboculars — Small scales between eye and upper labials in a few snakes (Fig 24)

Supraocular — A plate lying just above the eye, between the latter and the frontal plate (Fig 78A, B)

Tail — The part of the animal posterior to the anus

Temporal, anterior — One or two (occasionally more) longitudinally elongated scales, arranged one above another, behind postoculars and between parietals and upper labials (Fig 78A)

Temporal, posterior — One, two, three, or more longitudinally elongated scales, lying one above another, behind the anterior temporals and between the parietals and upper labials (Fig 78A)

Ventrals — Large scales on lower surface of body between head and anal plate (Fig 78C, E)

Ventral scales. — See Ventrals.

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Abbreviations are as follows: A M N H, American Museum of Natural History, Cornell Univ. Zoölogy Department of Cornell University, U of M, Museum of Zoology of the University of Michigan, U S N M, United States National Museum

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